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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,762	09/19/2005	Shinji Kawasaki	791_340	8406

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EXAMINER	
ROBINSON, LAUREN E	
ART UNIT	**PAPER NUMBER**
1794	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/549,762	KAWASAKI ET AL.	
	Examiner	Art Unit	
	LAUREN ROBINSON	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 July 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities: The specification is objected to because in paragraph 0014, the applicants disclose that the original mixture prior to the process steps is a mixture of silicon nitride, silica and a pore former and this produces silicon-silicon carbide particles. This is objected to because it is unclear in the disclosure how the above mixture can produce a silicon-silicon carbide structure and also, the applicants' examples disclose that the mixture is actually silicon and silicon carbide which thereby produces the silicon-silicon carbide structure. It is the examiner's position that the components comprising the mixture in paragraph 0014 is merely a typographical error as every other example illustrates the later.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 12-21 are rejected under 35 U.S.C. 103(a) as being obvious over Lu et al. (US Publication No. 2003/0057581) which has a priority date of August 24, 2001.

Regarding claims 12-13: Lu et al. teach a process for forming a silicon nitride-bonded silicon carbide monolith (abstract). They teach that the monolith is a porous material (0007) is comprised of silicon carbide particles mixed with silicon metallic particles and during product, the above particles form a silicon carbide-silicon particle structure

(aggregate) (0021). Also, they teach that there are pores formed in between and the silicon nitride bonding material bonds the silicon carbide particles in a direct neck binding characteristic (Table 1, 0002, 0040, Fig. 1, Claim 1). The reference also discloses that the silicon nitride binder is preferably free of fiber-like silicon nitride particles (columnar silicon nitride) (0002) and that the above bonded particles provide for the porous material to have an open porosity of between 44 and 55% (0030). While the above teaching is disclosed, the reference *does not specifically teach the pores between the particles are specifically defined by the silicon carbide particles and the silicon nitride binder or the pores having the specific surface area as claimed*.

Although the reference does not disclose the above limitations, the examiner notes that the porous material within the reference are comprised of the same essential materials, at similar concentrations, with similar structures and the porous materials are made by similar processes.

For example, the reference teaches in one example that the porous material is made by mixing amounts such as 18% silicon metal powder with 72% silicon carbide particles wherein 9% methylcellulose is then added as a temporary binder with an amount of 24% water and 1% additive added therein (Table). The applicants' disclose in paragraph 0055 of their disclosure that the porous material is made by mixing amounts such as 20% silicon metal with 80% silicon carbide particles wherein 8% of methylcellulose is then added as a temporary binder with an amount of 19% water and 1% of a similar additive added therein. Also, the reference discloses that the items are mixed together and then extruded to form a honeycomb body and then the honeycomb body is dried in air to burn off the binder (0008, 0021). The applicants' paragraphs 0055

disclose the same process wherein the particle mixture is mixed together and then extruded to form a honeycomb body wherein the body is then dried wherein the binder is burned off.

Also, the examiner notes that the reference teaches that after the binder is burned off, the honeycomb body is heated to 1450 degrees Celsius in the presence of argon for a sufficient time to allow the silicon particles to migrate around the carbide particles and then the atmosphere is switched to nitrogen and then the material nitriding the honeycomb from 1450 to 1600 degrees Celsius and then holding at 1600 for 5 hours (0021). The applicants disclose in paragraph 0055 that after the binder is burned off, the honeycomb body is heated to 1450 degrees Celsius in the presence of argon until a silicon-silicon carbide structure is formed. Then the atmosphere is switched to nitrogen and the structure is nitrided the honeycomb from 1450 to 1750 degrees Celsius and then holding at 1750 degrees Celsius for 4 hours.

Furthermore, the reference describes that after production, the silicon nitride bonding material is made into well rounded particles and they also disclose that these well rounded bonding particles form neck bonding with the silicon carbide particles (Tables, 0022, Fig. 1a). The examiner notes that this teaching would suggest that the silicon nitride would not be fully coating the entire surface of the silicon carbide particles when bonding them but rather only be present at specific locations wherein bonding occurs and according to the applicants' disclosure, this corresponds to the structure's illustrations. Also, the examiner notes that due to the reference teaching that pores are present in between the particles, then it is the examiner's position that one would recognize that when the particles bond, the pores will then be present between bonded

particles, which inherently includes the silicon nitride binder and since it was discussed that the binder is not present along the entire surface of the particles but merely at the bonding locations, one would recognize that the pores between would be defined by the surface of the silicon carbide particles and only a portion of the binder.

For the reasons above regarding the same structures, materials, method of production, it is the examiner's position that one of ordinary skill in the art would recognize that the reference's structure and method of production is so similar to the applicants', that similar characteristics of both structures would be produced and therefore, although the reference does not specifically discuss the above limitations, one of ordinary skill in the art would find it obvious that the characteristics would naturally flow from the reference **(Claims 12-13)**.

Regarding claims 16-17: The reference also teaches that the average pore size can be 9.6 microns (0025) **(Claims 16-17)**.

Regarding claims 18-19: While the reference discloses the above teaching, they do *not specifically disclose that the porous material will have a heat resistance temperature of 1200 degrees Celsius or more*.

Although the above teaching is not specifically disclosed, the examiner notes that within the reference, the final porous material is only comprised of silicon carbide bonded by silicon nitride and it is well known in the art that both of the above materials have heat resistant temperatures well above 1200 degrees Celsius. Also, the examiner notes that it would be recognized by one with ordinary skill in the art that properties of materials are affected by the properties of elements therein and although the reference did not disclose the overall heat resistant temperature, one would recognize and find it

obvious that the overall porous material would have similar properties of being heat resistant at 1200 degrees Celsius or above.

Furthermore, the examiner notes that as disclosed within the tables of the reference, the maximum temperature that the material is being produced is 1450-1600 degrees Celsius and one of ordinary skill would recognize that during production of a final material, one would recognize that it would not be desirable to heat a material above its' heat resistant temperature because it would be recognized that the product would decompose, lose its shape, etc. Therefore, it is the examiner's position that one of ordinary skill in the art would recognize that since the reference is able to produce a final solid product with beneficial properties by heating it at temperatures of 1450 to 1600 degrees Celsius, then they would have found it obvious that the material had a heat resistance within the above range.

For the above reasons, although the reference does not specifically disclose that heat resistant limitations, it is the examiner's position that one of ordinary skill in the art at the time of invention would have found it obvious that the final porous material having a heat resistance of 1200 to 1600 degrees Celsius or even 1450 to 1600 degrees Celsius would naturally flow from the reference **(Claims 17-18)**.

Regarding claims 20-21: While the above teaching is disclosed, Lu et al. is still *silent regarding the applicants' specific gas permeability*.

Although the reference does not specifically disclose the above limitation, the reference teaches that the porous material is used in diesel particulate filtering applications and that good permeability of the material is desired (0014-0015). Although the reference's examples do not specifically disclose the specific permeability as

claimed by the applicants, it is the examiner's position that one of ordinary skill in the art would recognize that when using a porous material such as the one above, the permeability of that material will affect the filtering capacity due to it being known that if permeability is increased, more substance will be able to go through the material and thereby be filtered by said material. Therefore, the examiner notes that if one desired to have more filtration, they would recognize that this could be obtained by adjusting the permeability of the material.

Also, the reference teaches that the permeability can be adjusted by parameters such as material thickness, pressure across said thickness, etc. (0029) and therefore, one of ordinary skill in the art would know that if one desired to adjust the permeability to obtain desired filtration results, they could do so by adjusting the parameters as set forth in the reference. As such, it is the examiner's position that one of ordinary skill in the art at the time of invention would have found it obvious to modify Lu et. al. to include that one could adjust the permeability of the material to any desired value, including the applicants' value, by adjusting the parameters set for in paragraph 0029 in the reference, in order to obtain any desired filtration results when the material is used for diesel particulate filtering applications **(Claims 20-21)**.

Response to Arguments

Applicant's arguments with respect to claims 12-21 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAUREN ROBINSON whose telephone number is

(571)270-3474. The examiner can normally be reached on Monday to Thursday 6am to 4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney at (571)272-1284. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Lauren E. T. Robinson
Examiner
AU 1794

/LAUREN ROBINSON/
Examiner, Art Unit 1794

/Carol Chaney/

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